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Height modernization arrives

Engineers volunteer time and expertise to install new technology for Graham County

By Aimee Staten
Managing Editor

Scattered throughout the Gila Valley are small, brass-capped monuments that bear witness to the passage of time and the silent shifting of the earth brought on by drought, floods and the friction of the planet's tetonic plates.

This week, those monuments will link the Valley's past with the technological future to ease the costs and efforts of mapping and surveying.

For hundreds of years, the National Geodetic Survey, an agency that defines and manages a national coordinate system, has set permanent markers into the soil all over the country by referencing exact horizontal and vertical positions as defined by latitude, longitude and height.

Starting today, these markers will be used far more efficiently than they ever have as the NGS continues a process called height modernization in Graham County.

Using the Global Positioning System (GPS), a group of 24 satellites that transmits signals all over the world, engineers from Graham, Gila and Cochise counties and the NGS are volunteering their time, equipment and expertise to locate and test the monuments for accuracy to create a network to connect neighboring counties and, eventually, the entire state to the Gila Valley.

"We call it building infra-

See **Modernizing height** on Page 12A

Photo by Ray Brunner

Testing the fixed-height tripod with survey-grade (high accuracy) GPS antenna and receiver are, from left, Michael Bryce, Graham County engineer, Heath Brown, town of Thatcher engineer, Frank Fox, Graham County engineering assistant, Michael Dennis, local geodesist, and Chris Scorse, Trueline Engineering Land surveyor in training.

Modernizing height:

Continued from Page 1A

structure for the infrastructure," Michael Dennis, a local geodisist, said.

The purpose of height modernization is to facilitate surveying of land for development, subsidence (the sinking of land), mapping, emergency and disaster response, drought monitoring, pipeline and aviation safety and flood insurance mapping, among other concerns.

The process precisely pinpoints the rise and fall of land surfaces to increase the efficiency of water delivery and drainage and help reduce agricultural runoff and water pollution.

In other words, when a contractor prepares to construct a water run-off slope, he can receive more accurate data to prevent pooling on the slope.

Height modernization also improves navigational aids, making aircraft approaches and landings safer, NOAA's National Ocean Service Web site says.

All of these issues are important to the Gila Valley, which has faced at least 10 years of drought, and during monsoons in past years, flooding. With the advent of rapid growth in the area, Ray Brunner, GIS administrator for the city of Safford, said this technology will be more important now than it would have been in the past.

"When we do surveying for property and highways, we should reference the monuments," he said.

When flooding occurs in low-lying ares, crucial roadways can be washed out, keeping people from reaching higher ground. Height modernization can help prevent this problem by enabling emergency planners to monitor and predict floodplains.

The problem with the former way of placing monuments is that different sets were placed in reference to each other, but not necessarily in reference to monuments placed in the years before. Monuments are also sometimes knocked over as population grows and housing developments expand.

GPS will help locate the monuments and record any shifting of position from the time the network is created to the time a survey is conducted.

Graham County benefits

A process that could cost hundreds of thousands of dollars is only going to cost the city of Safford a few hamburgers and lodging for some of the engineers while they stay in Safford for the two-day monument testing period.

Brunner and local engineers from the county and surrounding towns, as well as from Trueline Engineering and Souder Miller and Cochise and Gila counties, are volunteering their time to set up about a dozen fixed-height tripods and GPS receivers on the monuments to resurvey their coordinates.

The equipment was handed out on Tuesday, and the groups will travel to specified primary monuments and set up the fixed-height tripods and receivers. The new coordinates will allow NGS to create a network that closely resembles a net that doesn't depend on line-of-sight surveying as was the practice before.

Even if a mountain or tall building stands between two monuments, the GPS will enable surveyors to access the proper coordinates and heights.

The coordinates will also link Graham County to Cochise and Gila counties, which have already completed the height modernization process.

How does height modernization help?

Height modernization improves disaster preparedness and recovery. A good example of its effectiveness could be shown in the aftermath of Hurricane Katrina, which still weighs heavily on the mind of this country, because using GPS coordinates can facilitate the replacement of bridges, levees and roads while enabling surveyors to rebuild on higher ground.

Using the height modernization system can also be effective in Graham County, which has suffered from drought and flooding over the years.

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City of Safford almost GPS ready

By Aimee Staten
Managing Editor

If the city of Safford is a large engine, the height modernization network will be the oil that makes it run more smoothly than it ever has before.

From public safety to utilities, every aspect of the city's function will benefit from the aerial maps that will be made following the recent geodetic survey of the Gila Valley, Safford City Manager Huey Long said.

Technicians from Safford worked for several weeks to prepare for the arrival of David Minkel, the National Geodetic Survey state advisor, who arrived last week with a quarter of a million dollars worth of satellite equipment and three days in which to test and record the coordinates of the brass-capped monuments used for surveying land.

Ray Brunner, the GIS administrator for the city of Safford, which took the lead on the project, said several of his employees deserve a lot of credit for the preparation work they did.

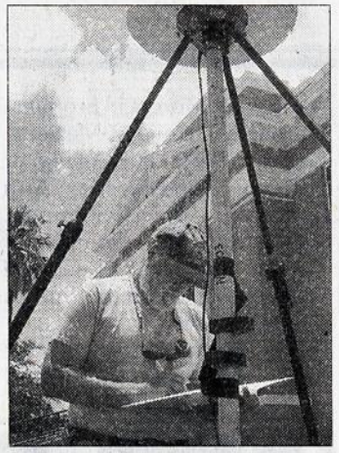

Photo by Ray Brunner

NGS State Advisor David Minkel records coordinates for the monument in front of the courthouse.

"At first, we thought it would be easy to find the monuments," Brunner said.

After several days of wading through underbrush in the desert heat with only a few of the hard-to-spot monuments located, Brunner said technicians Sarah Stockton and Richard Nava became determined to find the remaining monuments before Minkel arrived.

"They spent three to four weeks looking intently," Brunner said. Once all of the 28 monuments were found, the small team did the additional prep work of setting up sandbags and other needed equipment in anticipation of the survey.

All of that hard work will pay off in the next few months when the local system is connected to Global Positioning System satellites because aerial maps will be created that have numerous levels to allow law enforcement and firefighters to ascertain entrances, exits and fencing for residences and cut-off valves for utilities in the event of an emergency.

Safford Police Chief John Griffin said his department will benefit tremendously from the technology.

"The aerial photograph of the entire city will be regularly updated," he said. "That will give us an idea where utility lines go in, and if there is a fire, it will help us get to those places more quickly."

The program will allow the utilities department to swiftly locate cut-off valves for power if a line needs to be replaced or repaired. Developers will also be able to better plan for housing and roads because the elevation of the land can be accurately calculated using the new technology.

Another benefit for the Valley will be the flood-plain mapping FEMA will do once the system is in place. Local engineer Michael Dennis said FEMA is looking for communities that have mapping that meets the federal agency's specifications.

Credit given where credit is due

For a project of this magnitude to be successful, it takes the cooperation and vision of the community and its leaders to make it happen.

Minkel said he had never seen such enthusiasm for the height modernization project in any of the communities he had surveyed like he saw in Safford and the Gila Valley.

"You have some local guys who see the future — who see the benefit," he said.

Members of the Safford City Council praised Brunner and his team for their expertise and hard work, while Brunner praised the council for its support and vision. Councilor Ed Ragland and City Manager Huey Long said the city was fortunate to have someone of Brunner's caliber working on its behalf.

Brunner said the project benefited from the advice and direction of Michael Dennis and Minkel.

Engineers from Graham, Gila and Cochise counties, as well as from the surrounding towns and local engineering firms, volunteered to work with the city on the project.

After performing a quality assurance check on the recent survey, Dennis said it appears the data and supporting documentation are complete enough for formal processing by the National Geodetic Survey.

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Opinion

Valley can be thankful for locals' foresight, expertise

By
Aimee Staten
Managing Editor

Sometimes it takes looking through the eyes of a complete stranger to show us the value of what we have.

Most of us realize the benefits of living in such a beautiful, close-knit community that the residents work hard to improve every day. Recently, however, it became obvious that this Valley has something that others desire as well when David Minkel, the National Geodetic Survey state advisor, praised the community for its support of a high-tech GPS project and for its leaders' vision.

Minkel said he had never seen such enthusiasm for the height modernization project in any of the other communities he had surveyed like he saw in Safford and the Gila Valley.

"You have some local guys who see the future — who see the benefit," he said.

Those local guys are Ray Brunner, the GIS administrator for the city of Safford, and his team of technicians, as well as members of the Safford City Council and City Manager Huey Long, all of whom realized the benefit of having a system that will facilitate future construction and aid emergency response. Because of this new system, aerial mapping will reach heights of accuracy that have never before been achieved in the Gila Valley.

Not directly connected to the city is a local engineer who has made a name for himself as somewhat of an expert in the field of geodetics: Michael Dennis. This is the man who decided to try his hand at surveying using GPS equipment. When he found mistakes in the program he was using, he worked on the system until he had created a better one.

valuable.

Through the hard work and determination of the men and women on this team, the city of Safford and Graham County will receive another benefit in the form of free floodplain mapping by the Federal Emergency Management Agency (FEMA).

Without the proper infrastructure, which is what the height modernization survey will provide, this would be a cost-prohibitive endeavor.

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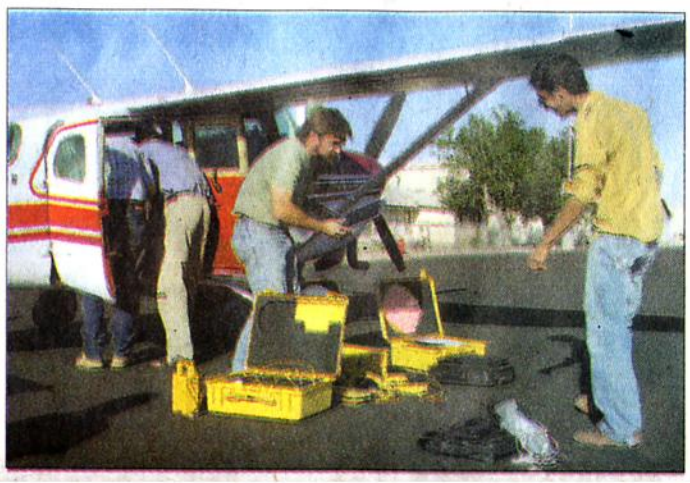
Aerial photography op



The city of Safford is in the process of taking new aerial photos of the Gila Valley that will be linked with the height modernization system recently implemented. Rick Bunger, above, prepares the equipment before the plane takes off.

Photos by Ray Brunner